



## Letter from the Director

Aloha,

At the conclusion of a speech earlier this week in Washington D.C., Pope Francis urged all of us to "keep moving forward." This sentiment applies to a variety of situations, from solving global problems such as climate change to persevering through personal dilemmas. When I heard this, I instantly thought of CTSA; although the program is facing a funding shortage for the FY15 development cycle, we will 'keep moving forward' to achieve our mission. I would like to extend my sincere appreciation to our CTSA supporters, including those who continue to participate on our committees after retiring from their careers, for graciously giving their time to help accomplish the program goals. Together, we all recognize that those goals cannot be achieved unless we collaborate and leverage our resources and opportunities, especially when facing development obstacles.

The 46th Pacific Island Forum, held in Papua New Guinea from September 8-10, focused on climate change and fisheries management in the region. Some leaders took the opportunity to express concerns about the overfishing of inshore fisheries and tuna stocks by foreign fishing fleets; this practice has limited the quantity of seafood available for local consumption. Furthermore, increasing impacts from climate change such as ocean warming and rising sea level only exacerbate the issue of island food security, as well as human health. There is a growing desire in the region to limit dependence on fossil fuels and imported goods, especially food. To this end, CTSA is working with stakeholders throughout the Pacific islands to secure their future seafood source through sustainable aquaculture farming. We are also encouraging a comprehensive approach to mitigating climate change that promotes energy efficient farming and healthy activities, such as using bicycles to get around the small islands instead of gas guzzling cars.

I am excited to 'keep moving forward' on the mission to help produce our essential food while preserving our environment. As I always, I welcome your thoughts and suggestions.

Mahalo,

*Cheng-Sheng Lee*

Executive Director, CTSA

## **CTSA Project Summary: Controlling and Eradicating *Polydora* Infestation in Oysters**

The parasite *Polydora websteri* has been known to infect oysters throughout the world, and the

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threat posed by an infestation must be addressed in order to successfully culture oysters in Hawaiian waters. One oyster farm in Hawaii was forced to shut down in early 2015 due to massive infestations of *Polydora*, which ruined most of one crop. Determination of which treatment methods would be most effective in Hawaii became critical and urgent, so the Center for Tropical and Subtropical Aquaculture supported a short-term effort to investigate the issue. The project was conducted at the Pacific Aquaculture and Coastal Research Center (PACRC) under the direction of Dr. Maria Haws; PACRC Shellfish Hatchery Manager / UH Hilo MS student Forrest Peterson carried out the work. The methods developed through the project have been demonstrated to successfully eradicate *Polydora* from oyster shells in a commercially feasible and economically viable manner.



Student research assistant counting worms

The first and primary objective of the project was to develop control and eradication techniques to prevent *Polydora* infection in bivalves in laboratory setting. To do so, Pacific Oysters (*Crassostrea gigas*) infected with *Polydora* were obtained and brought to the PACRC to use for testing treatments. All oysters were heavily infected with multiple *Polydora* worms to the extent that they could not be sold. At the time that the PACRC was conducting this research, the farm personnel were also testing methods that involved freshwater dips followed by a prolonged drying period. Oysters were randomly selected from the infected stock to serve as representative samples for each type of treatment, resulting in thirty oysters per treatment with a total of six different treatments. Researchers formulated five different treatments plus a control. The treatments were designed to utilize various combinations of chemicals or factors in an effort to find the most effective treatment or combination of treatments.

Although some of the single factor treatments had been tested by other researchers in the past, rarely have combinations of factors been tested. Hawaiian grown

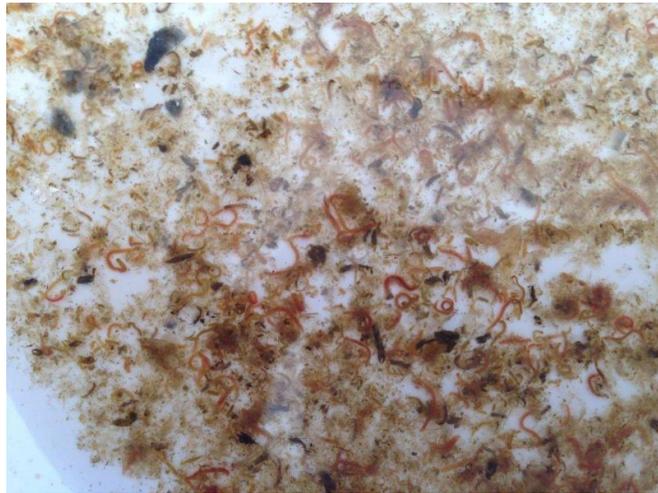
oysters are also cultured under different conditions than in most oyster farming areas, resulting in more fragile shells and seemingly less resistance to anaerobic conditions. The hypothesis was that by combining irritants or lethal components, treatment might be made more effective. Also, researchers choose treatments which had some potential to be applicable to field situations in Hawaii and which are relatively safe for humans. For example, although vermifuges might be more effective than the treatments selected, these could potentially be harmful to workers or have implications for food safety. The cost and time requirement of each treatment was an important consideration as well.

Oysters were placed in mesh bags at 30 oysters per bag and treated in individual containers. Industrial rock salt was used for hyper-saline solutions because it is a readily available and inexpensive. The treatments used and their results were:

1. 3% acid bath (HCl) in fresh water for 10 minutes followed by brine dip (250 g/l NaCl) for 1 hour followed by drying for 2 hour. This treatment resulted in thirty-four percent *Polydora* mortality and three percent oyster mortality.
2. 3% acid (HCl) bath for 1 hour followed by drying for 3 hours. This treatment resulted in thirty- eight percent *Polydora* mortality and twenty percent oyster mortality.
3. Hyper-saline solution (250 g/L NaCl) chilled with ice. Oysters are

submerged for 3 minutes then left to dry and warm slowly to ambient temperature for 3 hours. This treatment was previously tested in Australia and was called the "super slush puppy treatment". This was the most effective treatment resulting in 95-100 percent *Polydora* mortality and one percent oyster mortality.

4. 30-minute submersion in hyper saline (250 g/L NaCl) followed by 1 hour drying. This treatment is relatively efficient at thirty-one percent *Polydora* mortality and no oyster mortality. Interestingly, previous research reported this method as being highly effective.
5. Submersion in fresh water for one hour followed by drying for 3 hours (similar to the treatment being used at the oyster farm at the same time laboratory trials were conducted). This treatment was relatively ineffective at five percent *Polydora* mortality and no oyster mortality.
6. Control-not subjected to any treatment. The control for the experiment had two percent *Polydora* mortality and no oyster mortality.



*Polydora* worms that came out of oysters after treatment

Two of the *Polydora* eradication treatments were thus found to be effective in a laboratory setting. The "super salty slush puppy" resulted in nearly 100% *Polydora* mortality to no significant oyster mortality. In addition to treatment development in the laboratory setting, researchers assisted the farm manager with on-farm application of some of the treatments attempted in this work, not only for *Polydora*, but also to combat barnacle infestation.

The research conducted under the auspices of this project utilized existing knowledge to establish a new method for treating *Polydora* infections in bivalves. This new method has been found to be nearly 100% effective at killing *Polydora websteri* in their burrows. The treatments are also effective at preventing re-infection if treated on a biweekly basis. This treatment will enable bivalve farmers in Hawaii to treat infected oysters and continue farming without harming the animals. Additionally, this work provides insights that will help guide future research on the topic as the PACRC continues to look for effective methods to combat *Polydora*.

### **News from NOAA: Streamlining Hawaiian Fishpond Restoration**

The following is an excerpt from the [NOAA Fisheries announcement](#) on 9/22/15

The vibrant community of fishpond (*loko i'a*) practitioners in Hawai'i has been working to revive the productivity of traditional fishponds, and many *loko i'a* could again become active with restoration and maintenance. However, the complicated, expensive, and laborious permitting procedure remained a major obstacle to restoring and operating *loko i'a*. Recognizing this, fishpond practitioners came together with the local, state, and federal governments in 2012 to plan out a streamlined permitting process for the repair, restoration, and maintenance of *loko i'a*.

In 2015, the new process, known as *Ho'ala Loko I'a* ([click here to learn more](#)), became available to fishpond practitioners. Alan Everson, NOAA Fisheries' Regional Aquaculture Coordinator for the Pacific Islands Region [and CTSA Technical Committee member], was an integral part of the interagency team working on the streamlined permitting. This team was essential to the process, and responsible for coordinating with the various regulatory agencies to ensure that they were fully engaged and on board with the streamlined permit.

Earlier this year, the Hawai'i Department of Land and Natural Resources (DLNR) approved *Ho'ala Loko I'a*, which created a statewide permit for activities conducting fishpond restoration, repair, and maintenance, and stocking and breeding native species. This new, tiered permit system is in compliance with 17 distinct federal and state regulations, and allows fishpond practitioners to submit one consolidated permit application, instead of the five individual permits that were originally

required.

Under the new system, applicants for fishpond permits will discuss the history of the pond, the ecology of the pond system, their relationship to the pond and associated *ahupua'a*, the proposed work for the pond, and the proposed best management practices and water quality monitoring plans that they would follow. The DLNR is also in the process of creating an associated guidebook that will discuss federally and state-mandated best management practices for various activities.

[Click here to read the full announcement on the NOAA website.](#)

### **AquaClip ~ 37 Innovative Seafood Companies to Pitch at Fish 2.0 Finals**

*by Aquafeed.com staff. Sept. 17, 2015*

Fish 2.0 has announced that 37 companies from an entry field of 170, have been chosen to pitch their seafood businesses to investors at the competition's finals at Stanford University in November.

Nearly two-thirds (23) of the companies are post-revenue ventures that can demonstrate a market for their products-and those products are on the leading edge of innovation in aquaculture, aquaponics, technology, wild capture products, traceability, and the supply chain. The group is also notably international: only 17 businesses are based in the United States, including two with operations in Chile; six are in Canada; four are based in Latin America; five operate in the South Pacific; two are based in Europe; and three are in Southeast Asia.

"The diversity and breadth of the finalists shows that innovation in seafood is growing all over the world. We are especially excited to see sustainability and invention taking root in the markets where the fish are coming from, not just where they are consumed-and to see change happening throughout the supply chain," says Monica Jain, Fish 2.0 founder and executive director.

[Click here to read the full article.](#)

The Center for Tropical and Subtropical Aquaculture (CTSA) is one of five regional aquaculture centers in the United States established and funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) under active grants 2010-38500-20948, 2012-38500-19566, and 2014-38500-22241. The regional aquaculture centers integrate individual and institutional expertise and resources in support of commercial aquaculture development. CTSA was established in 1986 and is jointly administered by the Oceanic Institute and the University of Hawaii.

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